

NAIP Imagery Services

The USDA Farm Services Administration (FSA) coordinates and administers the National Agricultural Imagery Program (NAIP). This program is designed to collect hi-resolution (1mpp) digital aerial photography for the entire United States with emphasis placed upon agricultural areas. Imagery for each state is not collected annually, but rather follows a three-year cycle. NAIP imagery is applicable to nearly all land management, planning, and research efforts, especially those using Geographic Information Systems (GIS). For these reasons, there has been great interest in the 2009 Idaho NAIP acquisition among the GIS community.

The imagery is scheduled to be delivered late in 2009 but due to the size of the imagery files (approximately 1.2 GB per county [compressed]) certain logistical problems have been anticipated by the Idaho Imagery Framework Technical Working Group (TWG). The ideal solution to this problem leverages existing web service technologies as the medium by which the imagery will be delivered to end-users throughout the state. This technology was pilot-tested in a joint effort between Idaho State University's GIS Training and Research Center (GIS TRc) and the University of Idaho's INSIDE Idaho during the summer of 2009. Those tests demonstrated that existing, optimized web imagery services using ESRI's ArcGIS Server technology could be relied upon as an efficient delivery to the desktop mechanism.

To ensure robust failover of this solution, the Imagery TWG has recommended that the services be available at two locations (GIS TRc and INSIDE Idaho). The GIS TRc has developed a one-year service proposal/budget describing how these services will be developed and deployed and the goal of the Imagery TWG accomplished.

Scope of Work (GIS TRc)

Prior to full delivery of the final NAIP digital orthophoto quarter-quads (DOQQ's), a server (see attached specifications) will be purchased and setup in the existing rack/server room at the GIS TRc. This server will be connected by gigabit Ethernet (1 Gb/s minimum data rate) to the ISU Internet backbone. ESRI ArcGIS Server and Image Server software (part of the Statewide ESRI site license) will be installed and configured. Uncompressed 4-band imagery files (TIFF) will be stored on the server's RAID-5 volume and compiled into an Image Service Definition File. The ISDEF file will be served as a WMS service for those clients requiring direct access to the 4-band imagery.

The WMS service will be consumed by two ArcMap documents and symbolized using a 1) natural color composite (RGB) and 2) false-color composite (NIR,R,G). Each of these ArcMap documents will in turn be served as Map Services with multiple layers of caching stored on the server with optional locally caching enabled. The Map Services will provide rapid delivery of the imagery to the desktop of users across the state of Idaho and based upon preliminary pilot test results, these optimized services will perform faster than using the same imagery layers on a local hard drive.

The budget for this scope of work supports the delivery of these services for one year. However, once deployed it is anticipated that these services should be available for additional years with only a minimal maintenance contract.

Budget (GIS TRc)

Personnel:

The principal investigator and project supervisor, Keith T. Weber's will be partially funded by this proposal (\$1,426). The GIS Systems Administrator, Ms. Kindra Serr will be partially supported by this project as well (\$2,514 in total). The GIS Systems Administrator reports directly to Keith T. Weber, and will be responsible for the installation and configuration of the server hardware and software and performing day to day

maintenance on system. A grand total of \$3,940 is requested for personnel.

Fringe Benefits:

Fringe benefits (\$906) and health insurance (\$762) have been calculated using Idaho State University's standard rates (21% for full-time permanent employees and employees working more than half-time). Insurance paid by this proposal has been pro-rated based upon percent personnel time.

Travel:

There are no travel expenses included in this budget

Expendable Materials And Supplies:

There are no expendable materials and supplies included in this budget.

Other Direct Costs (Equipment):

To provide the level of service described in this document, a new server will need to be purchased (approximately \$7,800) and connected to the existing network (\$400). The total costs associated with this purchase and installation is \$8,200.

Indirect Costs:

Based upon the maximum indirect charges allowed for this service contract, ISU has reduced the regular indirect cost recovery rate from 20% to 6% totaling \$828.

The total funding requested for this proposal is \$14,636.

Scope of Work (INSIDE)

Prior to full delivery of the final NAIP digital orthophoto quarter-quads (DOQQ's), hardware and software (ESRI ArcGIS Server and Image Server software (part of the Statewide ESRI site license)) will be configured. An ArcGIS Server Image Service will be created using the uncompressed 4-band imagery files (TIFF). The ArcGIS Server Image Service will be used to create two fused cache ArcGIS Server Map Services. One Map Service will be symbolized using a natural color composite (RGB) and the other will be symbolized using false-color composite (NIR,R,G). An additional fused cache ArcGIS Server Map Service will be created displaying the footprint of each DOQQ source image. A web page and web applications that allows download of individual TIFF images and 100K mosaics (created by the Idaho Department of Water Resources) will be created. Metadata will be created and edited as needed and the system will be monitored.

Hardware/Software

- Spec, order and configure hardware and software as needed to integrate with INSIDE system

Distribute GeoTiffs

- Receive, rename, and move files to server
- Convert metadata from .met format to .xml
- Edit metadata adding thumbnail, synchronizing, distribution information, etc. & removing hard returns
- Create Image Service, build service overviews, add service metadata
- Create Natural Color Map Service w/ Fused Cache using Image Service
- Create IR Map Service w/ Fused Cache using Image Service
- Create Footprint Map Service that shows polygons of individual each image. Attributes to include at least image date.
- Create Web application for those who wish to explore data and download individual image tiles
- Design and create NAIP 2009 Web page

- Update 'zip-on-the-fly' program

Distribute 100K Tiles (IDWR)

- Receive, rename, and move files to server
- Edit metadata as needed
- Create Web application for those who wish to explore data and download individual image tiles

Monitor 9.4 Beta Development

- Be aware of changes in upcoming software release and take appropriate action to insure a smooth transition of applications and services

Monitor System

- Monitor hardware and software
- Answer questions regarding web services/web applications
- Answer offline request for data
- Compile statistics on number of downloads; network traffic; etc.

The budget for this scope of work supports the delivery of these data for one year.

Budget (INSIDE)

Personnel:

The principal investigator and project supervisor will be partially funded by this proposal (\$1,175). Temporary help will be supported by this project (\$16,640). Temporary help will report directly to the project supervisor, and will be responsible for majority of the tasks listed above. A grand total of \$17,815 is requested for personnel.

Fringe Benefits:

Fringe benefits (\$2,157) have been calculated using standard rates.

Travel:

There are no travel expenses included in this budget

Expendable Materials And Supplies:

A copy of Windows Server 2008 Standard, Visual Studio 2008, and Dreamweaver are requested for this project totaling \$750.00.

Other Direct Costs (Equipment):

Server and storage hardware are requested totaling \$11,500.

Indirect Costs:

Calculated at 6% (G&A) totaling \$1,933.

The total funding requested for this proposal is \$34,156.

Scope of Work (IDWR)

INSIDE will provide the 2009 NAIP data in a variety of ways. CCMs and digital orthophoto quarter-quads (DOQQ's) in uncompressed 4-band imagery files (TIFF) are expected to be available for download from their website. Additionally, INSIDE proposes to provide the data in various web mapping services (WMSs) for use in GIS. The WMSs are expected to be mirrored through ISU's GIS TReC. Although web mapping services are the direction of the future, reliability and speed of data transfer in regional offices and in some remote field locations is a major limitation. The use of WMSs on field equipment is not practical due to the

constraints of current cell-tower locations and their dependability. Another concern of WMSs is that even though most GIS are able to “project-on-the-fly”, it does so at the expense of server efficiency. The 100k tiles reprojected to the state standard projection system (IDTM83) also allow for greater flexibility for use in field equipment and in remote locations or regional offices where internet access may be slow or non-existent.

The Idaho CCMs are 3-band MrSID images in true-color. Unfortunately, there are transparency issues inherent in the MrSID format. Making the black background transparent in various GIS retains black speckling along the edges. The speckling artifact is problematic for GIS projects in which the area of interest crosses county lines and yields undesirable results for large project areas.

The final 2009 NAIP dataset will be 4-band, uncompressed, quarterquad (QQ) GeoTIFFs, in UTM projection and are expected to be delivered early spring, 2010.

The Idaho Department of Water Resources (IDWR) proposes to mosaic the QQ GeoTIFFs and provide them in 100k tile format with no overlapping NODATA areas. The popular and manageable 100k tiling scheme 1) allows faster and more reliable access for regional offices where internet connection is slow, 2) allows data storage on field equipment where internet access is unavailable, and 3) overcomes the background/transparency issues inherent in compressed imagery where areas of interest overlap.

Processing Steps

- The QQs will be delivered in UTM Zone 11 or 12. The state projection standard is Idaho Transverse Mercator (IDTM83). Therefore, IDWR will reproject approximately 6553 QQs (actual number to be determined) to IDTM83 prior to mosaicking.
- Mosaic reprojected QQs into 56 100k tiles. This step loads approximately 180 QQs per 100k tile (128 QQs within the 100k tile extent plus 52 surrounding QQs).
- Use compression software on 100k tiles.
- Edit metadata as needed.
- Distribute final deliverables to other users and INSIDE.

Budget (IDWR)

Personnel: A minimum of 60 working days is estimated for processing the QQ geoTIFFs into 100k tiles for statewide coverage. A grand total of \$10,000 is requested for personnel.

Fringe Benefits: There are no fringe benefit expenses included in this budget.

Travel: There are no travel expenses included in this budget.

Expendable Materials And Supplies: There are no expendable materials and supplies included in this budget.

Other Direct Costs (Equipment): Equipment costs shall include three 1.5 TB external drives for data transfer, archive, and exchange uses at an approximate cost of \$200/each.

Indirect Costs: There are no indirect costs included in this budget.

The total funding requested for this proposal is \$10,600.

Description	Costs			TOTAL
	ISU	UI	IDWR	
Personnel				
Principal Investigator- Keith T. Weber	\$ 1,426			
fringe	\$ 328			
health insurance	\$ 82			
Principal Investigator- Bruce Godfrey		\$ 1,175		
fringe		\$ 493		
GIS Systems Administrator- Kindra Serr	\$ 2,514			
fringe	\$ 578			
health insurance	\$ 680			
Student Temp help		\$ 16,640		
fringe		\$ 1,664		
SUB-TOTAL	\$ 5,607	\$ 19,972	10,000	\$ 25,580
Equipment				
	Cost			
Server hardware	\$ 7,800	\$ 11,500	600	
Network telecom installation costs	\$ 400			
SUB-TOTAL	\$ 8,200	\$ 11,500	600	\$ 19,700
Other Expenses				
Software and contracting		\$ 750		
SUB-TOTAL	\$ -	\$ 750		\$ 750
Direct costs	\$ 13,807	\$ 32,222		\$ 46,030
Indirect costs	\$ 828	\$ 1,933		\$ 2,762
TOTAL	\$ 14,636	\$ 34,156	10,600	\$ 59,391